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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/774,964	02/09/2004	Thomas A. Trabold	8540G-000148	5570

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EXAMINER
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RUTHKOSKY, MARK

ART UNIT	PAPER NUMBER
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1795

MAIL DATE	DELIVERY MODE
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07/14/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

10/774,964

**Applicant(s)**

TRABOLD ET AL.

**Examiner**

Mark Ruthkosky

**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 May 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 and 4 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1 and 4 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SE/US)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/4/2009 has been entered.

***Claim Rejections - 35 USC § 112***

The rejection of claims 1 and 4 under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement has been overcome by applicant's arguments. Specifically, Applicants note:

"Applicants respectfully assert that such controller logic is straightforward; there is nothing in making and using the claimed fuel stack that is not amply enabled by the present specification in view of well-known fundamentals of on-board computers and controllers and the basic, ubiquitous mathematical technique of calculating root-mean-squares from a set of value. A specification is enabling if it allows a person skilled in the art to make and use the invention without undue experimentation. In re Wands, 8 U.S.P.Q.2d (BNA) 1400 (Fed. Cir. 1988). "A patent need not disclose what is well known in the art." Id. at 1402. One of ordinary skill in the fuel cell art would know how to implement a computer having controller logic as claimed by Applicants."

“Applicants respectfully assert that they have provided “all information necessary to perform the function, except for basic mathematical techniques that would be known to any person skilled in the pertinent art.” Aristocrat Tech. Australia PTY Ltd. V. Int'l Game Tech., 86 USPQ2d 1235, 1242 (Fed. Cir. 2008). Applicants' fuel cell includes a computer including a controller which controls the fuel cell using logic based on pressure fluctuations calculated using a root-mean-square value. The “basic mathematical technique” of calculating a root-mean-square is a simple statistical calculation well-known to one of skill in the art. See, Electronics Engineers' Handbook, 3rd Edition, Donald G Fink, et al at 3-20 (1989).”

***Claim Rejections - 35 USC § 102/103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
- (c) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by DiPierro Bosco et al. (US 6,103,409.)

The instant claims are to a fuel cell stack comprising:

- a fuel cell having an inlet, a flow field in fluid communication with said inlet and an outlet in fluid communication with said flow field;
- a vaporized water source in fluid communication with said inlet;
- a differential pressure transducer repeatedly measuring a differential pressure across said flow field and generating a set of differential pressure signals; and
- a controller in communication with said differential pressure transducer, said controller having executable logic for determining a root-mean-square value from said set of differential pressure signals and control circuitry for controlling said vaporized water source in response to the root-mean-square value.

The instant claims are to a product, a fuel cell stack and not to a process of operating a fuel cell stack. The claims include intended use limitations and process steps. For example, the limitation, "for determining a root-mean-square value from said set of differential pressure signals" is an intended use of the controller. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use; then it meets the claim.

The limitation, "a differential pressure transducer repeatedly measuring a differential pressure across said flow field and generating a set of differential pressure signals" is a process

step for using the transducer. The use of the claimed controller and the steps performed by the claimed controller provide structure to the invention by showing that these structural features are connected, but do not limit the product claim with respect to the use. The controller only need be capable of performing the steps to read upon the claim.

DiPierro Bosco et al. (US 6,103,409) teaches a fuel cell stack comprising a fuel cell having an inlet, a flow field in fluid communication with said inlet and an outlet in fluid communication with said flow field (see figure 1 and col. 3, line 65 to col. 5, line 37); a vaporized water source in fluid communication with said inlet (col. 1, lines 48-65; col. 2, lines 14-end); a differential pressure transducer for measuring a differential pressure across said flow field and generating a set of differential pressure signals (paragraph bridging cols. 4-5); and a controller in communication with said differential pressure transducer, said controller having executable logic for determining a differential pressure fluctuation parameter from said set of differential pressure signals and control circuitry for controlling said vaporized water source in response to said differential pressure fluctuation parameter (col. 5, line 1 to col. 6, line 25.) Computers, microprocessors and logic are disclosed. The microprocessor includes a common digital computer with ROM, RAM, EPROM, instructions, algorithms, data manipulation and may be fitted with the Microsoft Windows systems (col. 5, lines 35+.) It is noted that Windows includes Excel spreadsheets which have executable logic for determining a root-mean-square value. The microprocessor may include a specific program for carrying out the functions of the processor. The controller is capable of determining a differential pressure fluctuation parameter as a representative statistical value as a representative statistical value as a root-mean-square value based on standard mathematical logic inherent to a microprocessor. The controller has

executable logic and control circuitry to control the vaporized water source. Thus, the claims are anticipated.

Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over DiPierno Bosco et al. (US 6,103,409,) as described above in view of Eryurek et al. (US 6,539,267.)

The teachings of DiPierno Bosco et al. (US 6,103,409) have been made of record in the previous section. DiPierno Bosco et al. (US 6,103,409) teaches a fuel cell stack comprising a vaporized water source, a differential pressure transducer and a controller having executable logic and control circuitry for controlling said vaporized water source in response to said differential pressure fluctuation parameter. DiPierno Bosco et al. (US 6,103,409) does not teach that the controller determines a differential pressure fluctuation parameter as a representative statistical value as a root-mean-square value from said set of differential pressure signals and controlling said vaporized water source in response to the root-mean-square value.

Eryurek et al. (US 6,539,267) teaches a process system for determining a statistical parameter related to a process which can be used in statistical process control systems (abstract, claim 1, col. 3, line 1 to col. 4, line 67; col. 8, lines 1-55.) The device includes a sensor providing output related to the process including a pressure sensor (claims 6-7), input and output circuitry, and computing circuitry (claims 1-6.) The statistical parameter may be the root-mean-square of the input (claim 4.) The controller is used to process variables that are typically used in a control process (col. 2, lines 30-end.)

If the claims are not considered anticipated by DiPierno Bosco et al. (US 6,103,409), as described above, then it would have been obvious to one of ordinary skill in the art at the time of

the invention for the controller to determine the differential pressure fluctuation parameter as a representative statistical value as a root-mean-square value from said set of differential pressure signals as taught by Eryurek and control said vaporized water source as taught by DiPierro Bosco in response to the root-mean-square value. Such a controller will allow for the accurate control of the device (col. 4, lines 1-67), and have increased sensitivity and control monitoring deficiencies such as drift, bias and noise (col. 6, lines 10-60.)

The invention is obvious since the controller logic is straightforward. There is nothing unexpected in the claimed fuel stack that is not obvious in view of well-known fundamentals of computers and controllers and the basic, ubiquitous mathematical technique of calculating root-mean-squares from a set of values. Further, the prior art fuel cell includes a computer including a controller which controls the fuel cell using logic based on pressure fluctuations. Although the DiPierro Bosco reference does not include using a root-mean-square value, the "basic mathematical technique" of calculating a root-mean-square is a simple statistical calculation well-known to one of skill in the art. As noted in applicant's arguments, one of ordinary skill in the art has the ability to perform basic mathematical techniques that would be known to any person skilled in the art.

### ***Response to Arguments***

Applicant's arguments filed 5/4/2009 have been fully considered but they are not persuasive.

Rejection of claims under 35 U.S.C. 112, first paragraph. This rejection has been overcome based on applicant's arguments.



Rejection of claims under 35 U.S.C. § 102(b) OR under 35 U.S.C. § 103(a) as being unpatentable over DiPierno Bosco et al. (U.S. Patent No. 6,103,409.) Applicants note that DiPierno-Bosco et al. does not disclose executable logic for determining a root-mean-square of differential pressure fluctuation parameter as a representative statistical value from said set of differential pressure signals.

In response to applicant's argument that the references fail to show this feature of applicant's invention, it is noted that DiPierno-Bosco et al. discloses executable logic for determining a differential pressure fluctuation parameter as required by the claim because the reference teaches a controller including a computer or microprocessor with data input from the system. Computers, microprocessors and logic are disclosed. The microprocessor includes a common digital computer with ROM, RAM, EPROM, instructions, algorithms, data manipulation and may be fitted with the Microsoft Windows systems (col. 5, lines 35+.) It is noted that Windows includes Excel spreadsheets which have executable logic for determining a root-mean-square value. The microprocessor may include a specific program for carrying out the functions of the processor. The controller is capable of determining a differential pressure fluctuation parameter as a representative statistical value as a representative statistical value as a root-mean-square value based on standard mathematical logic inherent to a microprocessor. The statistics derived from the computer program are not structural elements of the invention. Thus, the cited prior art anticipates the claimed subject matter.

Applicants further argue that the differential fluctuation parameter is different from the DiPierno Bosco et al. parameter because Applicant's parameter is based on the statistical root mean square of the pressure fluctuation determined from the executable logic.

This argument is not persuasive. The instant claims are to a product, a fuel cell stack and not to a process of operating a fuel cell stack. The claims include intended use limitations and process steps. For example, the limitation, “for determining a root-mean-square value from said set of differential pressure signals” is an intended use of the controller. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use; then it meets the claim. Structural weight is given to the fuel cell stack and to the controller, for example a computer, however, because the invention is to a product, patentable weight is not given to the data collected by the computer.

MPEP 2114 states under the heading noted: APPARATUS CLAIMS MUST BE STRUCTURALLY DISTINGUISHABLE FROM THE PRIOR ART. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997.) MANNER OF OPERATING THE DEVICE DOES NOT DIFFERENTIATE APPARATUS CLAIM FROM THE PRIOR ART. A claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987.) Therefore, the differential fluctuation parameter is not different, as claimed, from the DiPierro Bosco et al. parameter.

Applicants further argue that the claimed invention "offers unexpected benefits compared to the prior art DiPierro Bosco system. Applicants' claimed invention can control humidification with no prior knowledge of unflooded stack pressure drops at because Applicants' detection method considers only fluctuations about the mean pressure drop reading. Applicants' claimed invention provides sensitivity and speed of measurement which is not disclosed, taught by, or inherent in the DiPierro Bosco et al. system which is limited to measurements based on the reference fuel cell." Additionally, Applicants' claimed fuel cell provides "an accurate determination of the onset of flooding status and control" and "optimization of stoichiometry with a comparable optimization of air compressor capacity, efficient management of rapid power transits, and data for effective management of stack purge."

Applicant's arguments with respect to claims 1 and 4 have been considered but are moot in view of the new ground(s) of rejection. However, it is noted that the figures cited by applicant are not comparable and are not commensurate in scope with the claims. The claimed invention does not require a computer programmed to carry out a particular algorithm. The unique differential fluctuation parameter noted by Applicant has not been disclosed and the claims do not contain limitations that reflect structure of a unique fuel cell that has not been taught in DiPierro Bosco.

Further, it is noted that the intended use of the system is not given patentable weight, so the manipulation of the data does not provide unexpected results with regard to the claimed structure. The acts and results noted in the response are not structural claim limitations that are given patentable weight.

In addition, the results noted by Applicants are not unexpected since Eryurek teaches a process system for determining a statistical parameter related to a process which can be used in statistical process control systems (abstract, claim 1, col. 3, line 1 to col. 4, line 67; col. 8, lines 1-55.) The device includes a sensor providing output related to the process including a pressure sensor (claims 6-7), input and output circuitry, and computing circuitry (claims 1-6.) The statistical parameter may be the root-mean-square of the input (claim 4.) The controller is used to process variables that are typically used in a control process (col. 2, lines 30-end.) Such a system is equivalent to the data manipulation claimed and would inherently provide the same results.

Finally, the invention is obvious and not unexpected since the controller logic is straightforward. There is nothing unexpected in the claimed fuel stack that is not obvious in view of well-known fundamentals of computers and controllers and the basic, ubiquitous mathematical technique of calculating root-mean- squares from a set of value. Further, the prior art fuel cell includes a computer including a controller which controls the fuel cell using logic based on pressure fluctuations. Although the reference does not include using a root-mean-square value, the "basic mathematical technique" of calculating a root-mean-square is a simple statistical calculation well-known to one of skill in the art.

For these reasons, the claims stand rejected.

#### ***Examiner Correspondence***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The

examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free.)

/Mark Ruthkosky/

Primary Examiner, Art Unit 1795